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(56) Documents cited

None

(58) Field of search

F2E

Selected US specifications from IPC sub-class F16D

## (54) Brake actuator for a hydraulic motor

(57) The housing and the shaft structure of a hydraulic motor are in a known manner provided with brake discs (3,4) which are actuated by a movable part (10) which is spring-loaded (16 or 17) on one side and subjected to a hydraulic pressure on the other side. The pressure chamber (8) is further defined by a part (9) stationarily secured on a shaft (2). The parts (9, 10) are reversible as can be seen from the upper and lower halves of the figure and can be used with springs (16 or 17) to provide a spring actuated, pressure fluid released brake, or a pressure fluid actuated, spring released brake.

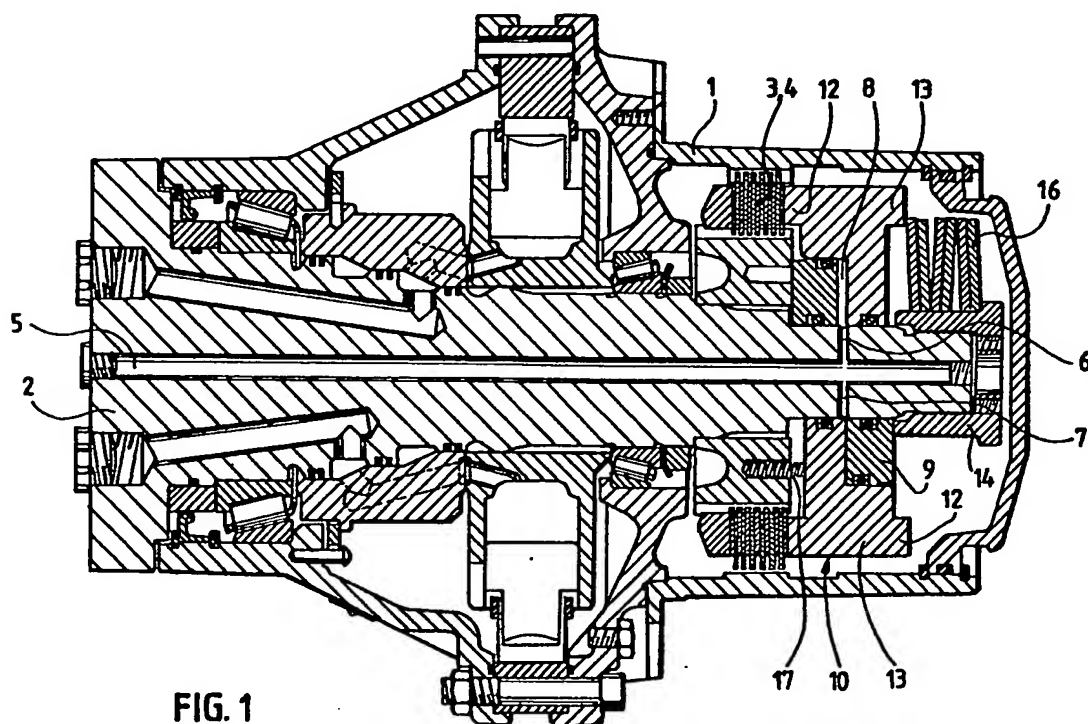


FIG. 1

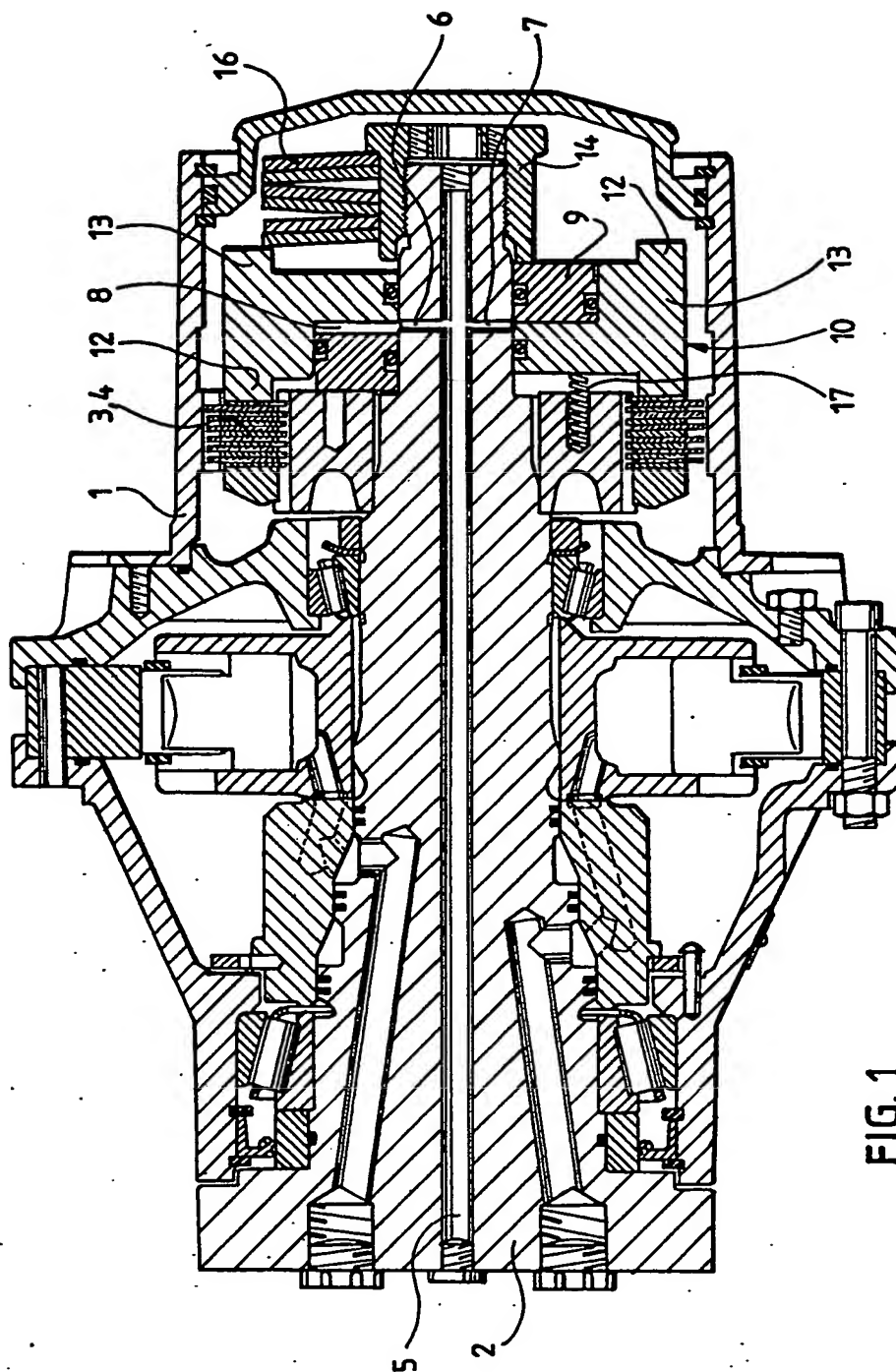


FIG. 1



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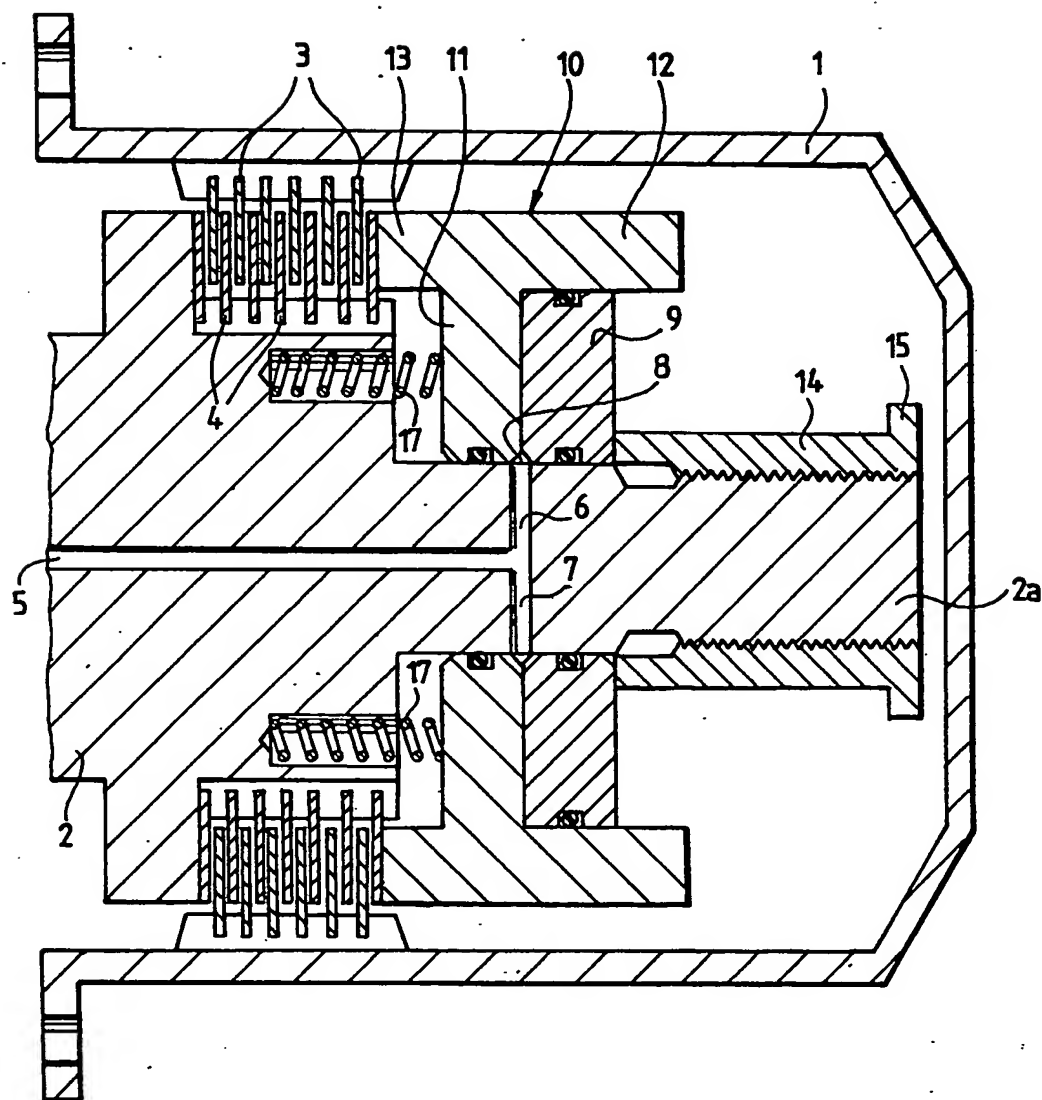


FIG. 3

## SPECIFICATION

### A brake for a hydraulic motor

- 5 The invention relates to a hydraulic motor, the mutually rotatable housing and shaft structure of which are provided with cooperating brake discs and the shaft of which comprises an axial boring connectable to a pressure source and issuing on the surface of the shaft, preferably close to the opposite end of the shaft.

The disc brake of a hydraulic motor is usually either spring-loaded or pressure-loaded. Previously it has always been necessary to provide different structural elements for spring-loaded brakes and pressure-loaded brakes, wherefore both the manufacturing costs of such elements and costs caused by the storage thereof are rather high.

- 20 The object is to provide a new brake structure, the parts of which are suitable both for a spring-loaded and a pressure-loaded brake.

According to the invention, this object is achieved in a hydraulic motor of the type mentioned above mainly by providing the boring with a cylinder structure fitted in connection with the surface opening(s) thereof, said structure comprising a part stationarily secured on the shaft and a movable part acting on the brake discs of the shaft; by subjecting the movable part to a spring loading in a direction opposite to the pressure prevailing in the cylinder chamber of said cylinder structure, and by constructing the stationary part and the movable part of the cylinder structure so that their positioning with respect to each other in the direction of the shaft is interchangeable for a spring-loaded and correspondingly for a pressure-loaded brake structure.

- 40 Claims 2 to 4 more closely define the preferred embodiments of the invention.

The invention will be described in the following with reference to the attached drawing.

- 45 *Figure 1* is a longitudinal section of a hydraulic motor.

*Figure 2* illustrates the invention when applied to a spring-loaded disc brake.

*Figure 3* illustrates the invention when applied to a pressure-loaded disc brake.

- 50 In *Fig. 1*, the upper half illustrates a spring-loaded brake and the lower half a pressure-loaded brake. The invention should be more easily understood on the basis of *Figs. 2* and *3* which are the ones mainly referred to in the following.

In the example of the drawing, a housing 1 of the motor rotates around a stationary shaft 2. Said housing 1 and shaft 2 are provided with brake discs 3 and 4 respectively, which brake the motor when they are pressed against each other. The reference numeral 5 indicates a shaft boring which is connectable to a pressure source and which branches—the reference numerals 6 and 7—close to the opposite end 2a of the shaft onto the

surface of the shaft. A cylinder structure extending around the shaft is provided in connection with these openings, said structure comprising a stationary ring plate 9 and a movable part 10 provided with a ring plate 11 and two ring branches 12 and 13 extending from the periphery thereof. The branch 12 positioned on the side of the ring plate 9 is preferably longer than the branch 13 extending in the opposite direction, said longer branch 12 extending closely against and beyond the periphery of the ring plate 9. The end 2a of the shaft is provided with a stationary support 14, such as a nut.

80 In the case of a spring-loaded brake, the parts 9 and 10 are mounted according to *Fig. 2*. The ring plate 9 is secured on a shaft shoulder and the movable part 10 faces the end 2a of the shaft. The ring branch 12 of the movable part 10 acts on the discs 4 of the shaft and the other, shorter branch 13 serves as a counterpart for cup springs 16 or the like, said springs 16 being secured also on a head 15 of the nut 14. When the chamber 8 is under a low pressure, the springs 16 press the movable part 10 to the left and the press discs 3 and 4 are pressed against each other. On the other hand, the pressure prevailing in the chamber 8 tends to displace the part 10 to the right, and when the pressure is high enough, the springs 16 yield to allow free rotation of the housing 1.

*Fig. 3* illustrates a pressure-loaded alternative. The ring plate 9 is thereby supported on the end of the nut 14, the shorter ring branch 13 of the movable part acting on the brake discs 4 of the shaft. In the situation of *Fig. 3*, the boring 5 is pressureless, whereby springs 17 have displaced the movable part 10 against the ring plate 9 and the housing can rotate freely. The pressure fluid flowing through the boring 5, in turn, forces its way between the ring plate 9 and the ring plate 11 of the movable part, thus enlarging the chamber 8 to effect displacement of the movable part 10 to the right in the figure, whereby the brake discs 3 and 4 are pressed against each other.

The parts 9 and 10 are identical in *Figs. 2* and *3*. Besides that the same parts can be used both in a spring-loaded and a pressure-loaded brake the specific solution of the drawing is advantageous as regards the mounting and maintenance thereof; the end cover next to the shaft end 2a or alternatively that part of the motor housing which is visible in *Figs. 2* and *3* being relatively easily detachable, it is not necessary to really disassemble the motor. In their details, the parts 9 and 10 can, of course, differ from the shapes of *Figs. 2* and *3*, as also appears from *Fig. 1*.

## CLAIMS

1. A hydraulic motor, the mutually rotatable housing (1) and shaft structure (2) of

which are provided with cooperating brake discs (3, 4) and the shaft of which comprises an axial boring (5) connectable to a pressure source and issuing on the surface of the shaft, preferably close to the opposite end (2a) of the shaft, a cylinder structure (8, 9, 10) being fitted in connection with the surface opening(s) (6, 7) of said boring (5), which cylinder structure comprises a part (9) stationarily secured on the shaft (2, 2a) and a movable part (10) acting on the brake discs (4) of the shaft and exposed to a spring loading (16, 17) in a direction opposite to the pressure prevailing in the cylinder chamber (8) of the cylinder structure (8, 9, 10), characterized in that a ring plate (9) forms an integral part of the cylinder structure and that said movable part (10) comprises a ring plate (11), from the periphery of which ring branches (12, 13) extend in both directions of the shaft, one branch (12) thereof extending closely against and beyond the periphery of the stationary ring plate (9) so that the positioning of the stationary ring plate (9) and the movable part (10) with respect to each other in the direction of the shaft (2) is interchangeable for a spring-loaded (16) and correspondingly for a pressure-loaded brake structure.

2. A hydraulic motor according to Claim 1, characterized in that the ring branches (12, 13) of the movable part (10) are unequal in length and that the longer branch (12) extends closely against and beyond the periphery of the stationary ring plate (9) and is supported alternatively on cup springs (16) or the like, whereby the shorter branch (13) of the movable part is in contact with the brake discs (14) of the shaft (a spring-loaded brake), or on the brake discs (4) of the shaft (a pressure-loaded brake).

3. A hydraulic motor according to Claim 1 or 2, characterized in that the end (2a) of the shaft is provided with a stationary supporting member, preferably a nut (14), on the inner end of which the ring plate (9) is supported when the ring plate is on the side of the shaft end (2a) with respect to the movable part (10), and the head (15) of which serves as a counterpart for the cup springs (16) or the like when the movable part (10) is on the side of the shaft end (2a) with respect to the stationary ring plate (9).